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Early And Late Injury Of Rust Mites On Oranges

By W. L. Thompson
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Lake Alfred

The history of rust mite control in Florida is almost as old as the industry itself, but every once in a while we learn more about it and add to the story. In a recent meeting of men interested in citrus culture one of the speakers stated that too much money was spent in growing third grade fruit. That statement is quite true in many respects, especially is it true with rust mite control. Sometimes the required number of sprays or dusts have been applied to produce bright fruit; but when the fruit was graded, a large percentage of it was injured and the grower was at a loss to know how it had happened. Sometimes the markings on the fruit were not recognized as rust mite injury but were mistaken for melanose or some other injury.

During the past several years the writer has been working on the combined control of scale insects and rust mites. In the course of investigation many fruits were examined for rust mites during all seasons of the year, and observations were made of all degrees of rust mite infestations and the injury caused by them. Two rather distinct injuries were observed: One was the smooth russet injury which is very well known, and the other had a speckled appearance which, if the fruit were not examined closely, somewhat resembled the injury caused by melanose. Other workers at the Citrus Experiment Station and also some growers had often observed the speckled marking on the fruit with questions as to the cause. Many growers and packing house men called it melanose but the pathologists disowned it.

The speckled fruit was often observed on trees that had apparently been well cared for as far as rust mite control was concerned. One year in some of our experimental plots a rather large percentage of fruit was marked in a Pineapple grove where the rust mites had been kept well under control after the first application of sprays. In one plot the first spray did not result in a satisfactory control of mites, and there were many more marked fruit in that plot than in any of the others, but the speckled oranges were more or less common over the whole block of trees. The first application was made on those plots on April 23, and at the same time even though some of the fruits were very heavily infested with rust mites, there was only a 35 per cent average infestation over the whole block. Since the whole block of trees had marked fruit but more in the plot where the first spray was a failure as far as rust mite control was concerned, the probable indications were that the speckled appearance of the fruit was due to rust mite injury when the fruit was comparatively small, or in a growing stage.

In 1936 the writer attempted to determine whether the injury in question was caused by rust mites, and if so, at what period of the season it most likely developed. At the Citrus Experiment Station an experiment was conducted in a small block of Valencia, Pineapple and odd varieties of oranges. There were three plots in the experiment, and each plot consisted of two rows with six trees per row, or a total of twelve trees. Plot 1 was kept commercially free of mites until September. Plot 2 received the first spray in mid June and was kept commercially free from mites the remainder of the season. Plot 3 received the first spray the middle of July.

Rust mites did not appear in plots 2 and 3 in sufficient numbers to cause injury until late May. Nevertheless in plot 2, which received the first spray in mid June, some of the fruit, when it colored, had a speckled appearance. In plot 3, which was not sprayed until mid July, there was a large percentage of the oranges with the speckled russeting of some with the rough solid russeting, but there were none with the smooth solid type. In plot 1, which was not infested

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A Resume of the Work of the Horticultural Department

BY G. H. BLACKMON
HORTICULTURIST, FLORIDA HORTICULTURAL EXPERIMENT DEPARTMENT

Florida horticultural crops in 1936, according to the U. S. Department of Agriculture, were valued at $65,725,000. Of this amount, fruit and nuts, accounted for $39,901,000, truck crops, $25,824,000, and the large commercial ornamental industry returned extensive revenues. All of Florida crops had a value of $88,146,000. It will be seen, therefore, that horticulture represented about 74 per cent of the total production.

Many types of horticultural plants are grown in Florida. Of these, a large percentage has been introduced from other parts of the United States, as well as from countries all over the world. The problems encountered in successfully growing the various species are legion and it is incumbent upon the Horticultural Department of the State Experiment Station to conduct experiments along such lines as are possible in an effort to learn their solution. Because of limitations, however, only a few of the most important ones can be included in the present list of projects.

Fifteen of such projects are now active and they include investigations in truck crops, citrus fruit storage, citrus juices, citrus maturity, tung-oil, pecans, ornamentals, minor fruits, and fumigation. Many phases of these problems are being studied under these general headings and it might be of interest to point out some of them. The work with vegetable crops is centered around phenological studies and testing of varieties; the effects of various groon manure crops on growth, yield and quality, and a study of fertilizer placement and requirements.

Citrus fruit storage investigations include a study of the effects of temperature, humidity, air condition and wrappers on the keeping quality of oranges, grapefruit, tangerines, and Satsumas. Citrus juices and pulps are being studied in an effort to develop satisfactory methods of manufacture that will permit safe handling and storing. Citrus maturity investigations are being made to gain an insight into the changes of the fruit from blossom through various stages of growth with reference to all characteristics.

Tung-oil studies are conducted along the lines of nutrient requirements for maximum growth and production of the trees; selection and testing of heavy-bearing strains; effect of zinc and other rare elements as correctives for bronzing or general deficiency troubles and also on growth and yield; and the effects of green manures on fruit production.

The work with pecans includes: variety and stock trials; effects of soils, cover crops and fertilizers on nut production; zinc sulphate as a corrective for pecan rosette and other physiological troubles.

Fumigation research deals with the effects of hydrocyanic and other gases on fruits, vegetables and nursery stock when used in controlling insect infestations.

Truck crop studies are in charge of Dr. F. S. Jamison. More than 150 varieties of vegetables are being grown in an effort to find strains more suitable for Florida production than those now being grown. Among those proving worthy of attention are Katahdin and Houma potatoes; California Wonder pepper, Glovel tomato, Klondike watermelon, and Straight-Eight cucumbers.

It has been shown that lettuce seed can be satisfactorily grown at Gainesville. This information is of definite advantage in the breeding program of this crop in the development of new varieties.

Perilla, an annual plant which produces oil-bearing seed, is being investigated. Considerable quantities of perilla oil (one of the drying oils) is imported annually. Of the four strains planted in 1936, **Perilla ocymoides** made the greatest growth, and **Perilla nankinensis** (purple red variety) produced the most seed.

Research with citrus fruit is being conducted by Dr. A. L. Stahl. It should be pointed out here that all citrus cultural investigations are carried out at the Citrus Experiment Station under the direction of Dr. A. F. Camp (formerly head of this department, and then one of the leaders in this project), who cooperates in supplying much of the fruit for the work in the Horticultural Department.

The work with wrappers has shown that iodine-impregnated papers, when used with moistureproof coverings, hold great possibilities in the keeping of fruit by controlling stem-end rot while the fruit is in storage.

In refrigeration research, a great deal of work has been done during the past few years covering the effects of temperature, humidities, wrappers, treatments, chemical composition, gases, and, to some extent, cultural treatments. Two outstanding findings have been the development of methods and equipment for: (1) Short periods of refrigeration to stabilize the market at times of overshipment; and (2) holding fruit in cold storage for two to five months, where such long holds may be profitable. Results of the phases that have been completed have been either published or prepared for publication in Station bulletins.

Methods have been developed for the production, cool storage and distribution of orange juice. Orange

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juice, extracted according to the Department's recommendations, could not be distinguished from the fresh product even after 10 days' storage. These methods are now being used by several commercial concerns.

The tung-oil industry in Florida has made major strides during the past few years and the 1936 production was the heaviest of record. No other horticultural development in the state has been so closely connected with this department. After tung trees had been imported from China by the U. S. Department of Agriculture, it remained for the Horticultural Department to determine through experimentation its adaptability to Florida soils and climatic conditions. These investigations were first conducted by Harold Mowry, now Assistant Director of the Experiment Station, to whom much credit is due for the findings during the early stages of the industry. The work is now in charge of R. D. Dickey and the writer, but was inder the direction of Dr. Camp before his transfer to the Citrus Station.

The most noteworthy achievement with tung-oil trees was the discovery that bronzing is largely a deficiency trouble and can be corrected with zinc sulphate, applied either to the soil or as a foliage spray. Many hundreds of acres of the present commercial tung tree plantings in Florida owe their existence to this one finding. Large acreages are now receiving zinc sulphate annually or as often as applications are required.

These developments led to the discovery that physiological troubles in other crops could be controlled with zinc. Frenching, a widespread troublesome chlorotic condition of citrus, is being corrected now with zinc over extensive areas.

Rosette in pecans and black walnuts has also yielded to zinc and considerable acreage of pecans has been treated.

Considerable work has been done in making selections for pure lines of high-yielding varieties. The need for this is very great and therefore, in these studies a large number of cross- and close-pollination of strains having desired characteristics have been made. Asexual methods of propagation in commercial production of tung-oil trees are greatly needed and this problem is being investigated.

In nutritional experiments several fertilizers are being used and both single and cluster type tung trees are included in the plots. Of these, the cluster types have generally borne heavier crops under like conditions and treatments, but tests have established the fact that both require plant foods application for maximum production. The effects of cover-crops of legumes on yields are being studied also in connection with fertilizer.

The pecan development in Florida is another industry in which the Department has assisted in its many problems and data are available to old and new growers alike. These investigations are being conducted by the writer. Work with fertilizers has shown that there is a varietal difference in the response to plant foods. It has shown also that prolific varieties, suitably located as to soils, climatic conditions and other factors, will produce profitable results, while unadapted sorts may return only a little more than the money invested in fertilizing materials. This is of great value to pecan growers, for it is now possible to know something about the response of different varieties and thus estimate the relative value of a fertilizing program.

Significant results were obtained

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FLORIDA CITRUS INDUSTRY LOSES LEADER AND FRIEND

In the recent death of C. W. (Joe) Lyons, the Florida citrus industry loses a prominent leader and loyal friend.

For a quarter of a century, Joe Lyons had been recognized as an active, alert and successful leader in industrial circles of South Florida. Connected with the fertilizer industry in Tampa, first with the Gulf Fertilizer Company and later as president of the Lyons Fertilizer Company, Mr. Lyons was known always as a pushing, aggressive and successful leader in the industry.

But Joe Lyons was more than a successful business man—much more. A firm believer in the citrus industry, past, present and future, he devoted his time, his energies and his money to the upbuilding of the industry. Possessed of firm convictions as to the best methods to be pursued in attaining the desired end, he was yet considerate of the views of others and generous in the judgment of those who failed to agree with him.

For twenty years the writer of these lines knew Joe Lyons intimately and well, and during those years we never knew him as other than a perfect gentleman, a loyal friend, a generous opponent. True to his own convictions and aggressive in pushing them, he accorded to those who disagreed with him the same measure of consideration which he expected for himself.

No man in South Florida enjoyed a wider acquaintance than Joe Lyons—and no man was more highly esteemed. And of the thousands who knew Joe Lyons, men, women and children, all were his friends. He was possessed of a personality which dispelled all thoughts of jealously, disarmed envy—a personality which inspired confidence and attracted friends.

In the passing of Joe Lyons, the citrus industry of Florida loses a staunch and tireless friend, the business circles of South Florida an able leader, the entire state of Florida a loyal and well-loved citizen, the writer of these lines a true friend—one whose friendship had been tried and tested on many occasions.

Joe Lyons will be missed. His place it will be impossible to fill.

ENORMOUS CITRUS CROP MARKETED

At the close of the citrus shipping season in Florida, it is not out of place to review the situation in the light of figures recently compiled.

The report of the Associated Citrus Growers and Shippers of Florida, issued on June 21, shows that Florida shipped 44,500 cars of grapefruit, of which 27,500 cars were fresh fruit and 17,000 cars of canned grapefruit. This compares with 27,100 cars last season of which 9,750 cars were of canned grapefruit. During the same season, Texas shipped 18,300 cars of fresh fruit and 6,700 cars of canned fruit, as against 5,200 cars of fresh fruit and 1,650 cars of canned fruit last year, an increase of nearly 400 per cent.

Florida grapefruit averaged $2.22 per box and Texas $2.09 per box, making the gross value for the 69,500 cars of the two states $60,416-000 as against a value of $25,712,329.52 for the 33,950 cars shipped from the two states last year.

Based on a cost of $1.70 per box for picking and shipping, the net value to the grower on the tree was $13,900,000 this year as against $11,-832,000 last season, a net gain for the growers of $2,068,000.

In the matter of oranges, Florida shipped this year to June 12, 17,163,200 boxes as compared to a total of 14,225,236 last season. The gross return this year was $54,578,976 as against $42,675,708 last year, a gain of $11,903,268.

Due to the freeze in California, that state up to June 5, had shipped only 12,150,600 boxes as against a shipment of 15,708,000 boxes last season. The Florida average price on auction markets was $3.30; California's average $4.02. This would make California's total value this year $48,845,412 as against last year's gross of $51,836,400.

Deducting California's loss from Florida's gain in gross returns, the value of oranges increased by $8,912,280. Based on shipping, packing and transportation charges of $1.80 per box the net tree returns to Florida orange growers this year is $23,685,216; last season's gross value $17,070,283.20, a gain to the grower of $6,614,932.80.

In view of the vastly increased production of grapefruit in Florida and Texas and the freeze in California, the foregoing figures indicate that the growers in the three principal citrus growing states have experienced a very satisfactory season.

The wise grower will endeavor to produce his fruit at the lowest practical cost per box but he will not sacrifice quality to do it. It is better to produce one box of quality fruit at a moderate cost than two boxes of poor fruit at a low cost.

EARLY AND LATE INJURY OF RUST MITES ON ORANGES

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with mites until late September, practically all of the oranges were marked but the injury was the smooth, solid type of russeting and none of the speckled type was observed.

The results of that experiment indicate that the speckled type of injury develops when mites infest the fruit while it is growing rather rapidly, and the smooth, solid type develops if the fruit is infested after it has more nearly reached the mature size.

The stage in the development of the fruit when rust mite injury ceases to produce the speckled condition and starts to develop the russet appearance has not been determined. In plot 1, all of the trees where the solid type of russeting occurred were Valencias, consequently the oranges were not full grown when they became rather heavily infested in October.

A more detailed study was made of early infested fruit in a Pineapple orange block of trees which was also located in the Station grove. By May 1, some of the fruits were very heavily infested and others were free of mites. On May 8, several hundred of the fruits were tagged and notes were taken as to the approximate degree of infestation of individual fruits, the appearance, and the size, or diameter, of the fruit.

The infestation ranged from fruit free of mites to fruit that had 50 or more mites per lens field. The lens field was a circle five-eighths of an inch in diameter. The fruit ranged in size from five-sixteenths of an inch to one and three-eighths inch in diameter. (A hand lens that magnified 10 times was used in making the mite counts, and in inspecting the young fruit for injury.) On May 9, the trees were sprayed with lime-sulfur supplemented with wettable sulfur and with the same type of spray were kept reasonably free of mites during the remainder of the season.

Usually no marks or discoloration were detected on young fruit that had one to three mites per lens field, but some of those had a few of the speckled markings when the oranges had colored. Dark areas in the creases were observed on fruit that had from four to ten mites per field, but if it were not closely examined through the lens the injury was not apparent. Practically all of the fruit that had four to ten mite per field developed the speckled russet injury in a limited area. As the number of mites per field increased, the areas of discoloration on the young orange trees were more noticeable. Fruit that had 50 or more mites per field usually was of a very light green or grayish color but upon close examination the area in the creases was very dark brown to black. Within a couple of weeks after the first observations were made, small cracks in the creases could be detected. Fruit that had 25 to 50 mites per field had the speckled injury more or less over the whole surface and those that had 50 or more mites per field usually developed the rough and very dark solid type of injury. When those oranges were examined under the hand lens they had the appearance of a network of cracks running in many directions. None of the smooth, solid russeting developed on those oranges.

The following is a partial list of notes taken of some of the tagged fruit before the mites were controlled and after the fruit had matured. Observations were made of two different areas on each young fruit and notations made of the approximate number of mites per field and any discoloration of the rind. Many of the tagged fruit had dropped during the season, consequently the fruit numbers are not in succession.

Notes on Early Rust Mite Injury

Tree No. 1

Frt. No.	Diameter in inches	Approx. No. of Mites per Lens Field	Appearance of Young Fruit	Degree of Injury on Mature Fruit
1	1	4 to 10 and 26 to 50	No record	Severe
2	1-2/16	4 to 10 and 26 to 50	Russet in creases	Severe
3	1-3/16	4 to 10 and 11 to 25	Russet in creases	Very severe
4	1-3/16	50 + and 50 +	Russet in creases	Severe
6	1-2/16	11 to 25 and 26 to 50	Russet in creases	Very severe
7	1-4/16	50 + and 50 +	Light green to grayish	Rough solid russet
13	1-2/16	26 to 50 and 50 +	Dark areas in creases	Medium to severe
18	1-3/16	11 to 25 and 11 to 25	Dark areas in creases	Medium
19	1-3/16	4 to 10 and 11 to 25	Dark areas in creases	Medium
34	1-2/16	50 + and 50 +	Grayish color to russet	Rough solid russet
40	1-3/16	Free and 4 to 10	No record	Medium
44	1-3/16	4 to 10 and 26 to 50	Dark areas in creases	Medium
46	1-3/16	Free and 4 to 10	No discoloration	Slight
50	14/16	1 to 3 and 1 to 3	No discoloration	Slight
51	1-3/16	Free and 4 to 10	No discoloration	Slight
52	1	4 to 10 and 11 to 25	Some dark areas in creases	Medium to heavy
54	1	4 to 10 and 4 to 10	No discoloration	Slight

Tree No. 2

4	10/16	Free and 1 to 3	No notes recorded	None
6	11/16	Free and 1 to 3		None
16	14/16	Free and 1 to 3		Slight
17	1-2/16	Free and 1 to 3		None
18	15/16	Free and Free		None
22	1	Free and 1 to 3		Slight
40	1-3/16	1 to 3 and 1 to 3		Slight
41	1-3/16	1 to 3 and 1 to 3		Slight
42	1-3/16	1 to 3 and 4 to 10		Medium
43	1-1/16	Free and 4 to 10		Medium
44	1	1 to 3 and 1 to 3		Medium
45	1-2/16	1 to 3 and 1 to 3		Slight
69	1-3/16	1 to 3 and 4 to 10		Slight
70	1-4/16	4 to 10 and 4 to 10		Slight

Slight — 1 to 10 spots
Medium — 10 to 50 spots over the whole fruit
Severe— 50 or more spots over the whole fruit
Very severe— Fruit that had almost solid rough russeting over half to whole fruit

In viewing through a hand lens or microscope the early injury caused by rust mites, several different types of lesions were observed. The most common marks were narrow, raised lines that had corked over and then cracked along the center. Those marks were in the form of branching lines, curves and circles with lines branching on the outside. The cracked lesions were a dark brown color along the edges and a light brown in the cracks. The lesions are very irregular in shape, but often resemble the general form of a star, the center being smooth and a light brown color. When the lines were in the form of a circle the inside area of the circle apparently was not injured and had the natural orange color. Another type of the speckled mite injury was characterized by smooth irregularly shaped marks with a light russet color, but the sharp star-like points were not present.

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Water Hyacinth And It's Use In Fertilizing Farm Crops....

BY E. F. DeBUSK
CITRICULTURIST
Florida State College of Agriculture

The water hyacinth, known botanically as Eichhornia Grassipes, is a native of South America and has been introduced exstensively into Europe, Asia, North America, Africa, and many of the islands of the tropical and semi-tropical areas around the world. It made its advent into North America, perhaps first in Louisiana, in the early eighties. In many parts of the world it has become a pest, and legislation has been proposed or passed for its eradication. As far back as 1897, only about seven years after it was introduced into the St. Johns river, it was proposed that the State of Florida enact laws making it a misdemeanor to introduce the weed into rivers and lakes having outlets.

The temporary beauty of the plant, attracting plant lovers for more than a century, has been largely its means of general dissemination. After the plant had been grown for several years in an artifical pond or pool near the bank of the St. Johns river above Palatka, it was desired, in 1890, to clean out the place, and the plants were thrown into the river. Presently a beautiful garden sprang up along the river's edge, attracting settlers who carried the plant up and down the river, planting it in front of their homes and settlements to beautify the river front. It has spread until it threatens to infest every fresh water stream and lake in the state. In addition to being a hindrance to navigation and pleasure boating, this weed greatly mars the beauty of our lakes and rivers; it may even convert shallow lakes into bogs by the detritus of dead plants which accumulate on the bottom; and it renders more difficult effective mosquito control. A blanket of hyacinths growing over the surface of a lake would seem to reduce the heat absorbing capacity of the body of water during the day time and thus reduce its frost protection to crops. It is believed that a growth of this weed repels trout and bass and thus changes the kind of fish population in our lakes and streams by adding color and changing the constituents of the water.

Eradication of this pest is beyond the hopes of the most optomistic because of its persistent growth habits, its combined vegetative production and sexual propagation. The 1935 report of the Department of Agriculture and Livestock of India says: "The plant has remarkable power to adapt itself to life in dry situations as well as free water. A rootstock thrown in mud will strike roots, and as the mud dries the plant adjusts itself to a land life and waits for the chance of getting into the water."

"The seeds are heavier than water, therefore, sink to the bottom and lie dormant there. When drying up destroys the old plants, seedlings come after water is restored."

"In cleaning out a tank seeds may be left on the bottom and germinate after the first sprinkle of water."

"The sprouting of seed may in some cases be delayed until the third, fourth or fifth year. The delay occurs only where the seed remains immersed in water. If they are subject to a period of drying they germinate promptly."

The freezes of December, 1894, followed by a second in February, 1895, killed only the upper part of the plants. They soon came out with vigorous growth. Research has not produced an effective non-toxic herbicide, as yet. Parasitic insects merely aid slightly in its control.

Control of the weed seems to be our only hope. Utilization of the plant in agriculture holds promise of aiding in practical control.

During the last twenty years, the Department of Agriculture of India and the Union of South America have been investigating the water hyacinth from the standpoint of eradication, control and utilization as a fertlizer in commercial crop production and as a fuel. The official report in India Agricultural Journal of 1925 says: "In experiments at the Institute of Plant Industry, India, results have been obtained which leave no doubt that the profitable utilization of the water hyacinth in Bengal and in Burma is a practical proposition."

As far back as 1897, a United States Department of Agriculture report says: "The water hyacinth is a good feed for cattle and hogs. Hundreds of these animals may be seen along the shores of the St. Johns river in the winter grazing on the weed." In the early nineties, stockmen are said to have carried the weed up and down the St. Johns river and its tributaries by boatloads and spread it as a feed for their cattle.

In those early days it was used extensively as a fertilizer for garden crops, especially cabbage and potatoes. A general practice in growing sweet potatoes was to bed out, fill the furrows with hyacinths, and then cover the material and plant in the ridge over it. Later on the practice was to distribute some fertilizer over the hyacinths and then cover, making the ridge for planting. For many years the plant has been used as a mulch in citrus groves located near the bodies of water where it grows. Mr. Bennett, of tung oil fame, has used it extensively and quite successfully in mulching tung trees. As a novelty addition to the discussion I might say that several years ago the writer had an interesting experience in directing the mulching of a block of large citrus trees. In June, about the beginning of the rainy season, the hyacinths were taken from a lake adjacent to the grove and distributed under the branches of the trees before drying out. A season of rains followed for several days, and the plants bloomed profusely. This is further proof of the plant's ability to adjust itself to a land life. It is also a suggestion that it might be used temporarily as transplanted flower garden where the material is needed as a mulch and as a supply of organic matter.

The weed has considerable fertilizer value. Analyses of the State Experiment Station show a content of 1% nitrogen and about 4% moisture basis. This would indicate a plant food value of about $7.00 per ton on the 4% moisture basis or 50 to 60 cents per ton green, as it runs 90 to 95 per cent water. It has additional value to farm crops represented by the organic matter. The

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IMPRESSIONS

..By..
Frank Kay Anderson

Albert Martin of Apopka, Sanford and way stations pausing to assure us that the offending sheep in the celebrated Martin bull pasture are due to be removed. Sheep, he says, do not do so well; and then, of course, they are sadly lacking in "it." However, the main reason, the confession continues, is the storm of protests from over the citrus belt due to the exposure of the desecration of the famous bovine playground in these columns. The power of the press.

Walking down "G" street in Washington, and alongside us John O'Rourke of Miami stopped, got red in the face, and began to splutter all kinds of language over the landscape. Following his glance we beheld in a swagger store window four mannikins all dressed up like Swiss battleships; and all four with negroid cast of features and in color a decided chocolate brown. Equality where is thy sting?

Looks as if congressional action in favor of a Medfly damage survey is due this session. Previously Congressman J. Hardin Peterson has been able to obtain favorable action in the House, but the project died out in the Senate. Now, with the high body already on record, it seems as if House concurrence is certain.

That, however, will be only the beginning of something or other. From what we are able to gather, the naming of the board to conduct such a survey is going to lie with Secretary Wallace. All the precedents at Washington indicate that. The Secretary, of course, will not be able to know which from t'other, so in the process of departmental procedure Lee Strong, head of the bureau of entomology, etc., probably will be asked for suggestions. He, in turn, probably will be open to suggestions, too. So in the end some of the men who had to do actively with the campaign against the fly in Florida may have very considerable influence in selecting the personnel.

Which somehow reminds of Elbert Hubbard's celebrated definition of reciprocity: "A clergyman teaching a widow to swim, in return for her kindness in having taught him the tango."

The elevation of Major George L. Berry of Tennessee to be senator from that state is rather gratifying to the fruit and vegetable interests of Florida. For the new senator has a very considerable acquaintance here, and is interested in these industries in that his big color printing plant turns out the labels for many shipping associations and shippers.

He exerted very strong influence in having Florida packing houses placed under the AAA, at the urgency of Florida growers, when it looked certain that they were to be under the jurisdiction of the NRA at the beginning of the New Deal.

And A. W. Hanley, Florida representative of the Berry outfit, is in constant circulation among the growers and shippers of the state, so the Major generally should be pretty well posted concerning Florida.

Air conditioning experts, it is said, shortly will be able to eliminate overdrafts. We thought our bank had attended to all that.

The well meant effort of Bayard F. Floyd to unload the secretaryship of the Florida State Horticultural Society deserved support which it did not obtain. He has done a wonderful job as secretary for now these many years; but that should not mean that he is to be penalized by having to hold it for life.

From Orlando Don Nicholson hazards the opinion that these new asbestos burial vaults are not going to be successful with the public. He thinks they are too suggestive.

Proud Papa Note: Capt. F. C. W. Kramer, Jr., of Leesburg, exultant over the news that son Robert had just passed the mental and physical examinations for West Point, and is to report there July 1.

Randall Chase, the w. k. treasurer of Chase & Co., finds that after a long hard day a glass of milk at bedtime is first aid toward early slumber. Sometimes he takes crackers and butter along with the milk.

And that reminds that just before Mr. J. C. Chase sailed for Italy recently a friend gave him some advice. "The only difference between the Fascist salute and the Ku Klux Klan greeting," he said, "is that one is given with the right hand and the other with the left hand. For the Lord's sake keep your presence of mind!" At last report Mr. Joshua was said to have been standing up on the boat deck looking at his hands and talking to himself.

As a golfer Frank Salisbury of the L. & N., railroad is probably the best shrimp eater in Florida circulation.

Beer sales are off. Wonder if the brewers have looked into the way that Louis A. Hakes of the Exchange buys orange juice for all comers?

Mrs. W. B. Ballard of Altamonte Springs took some visiting D. A. Rs. down to Bok Tower, and friend husband went along to chauffeur. Said the lady from Boston, "Isn't that entrancing melody; so inspirational,

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so—." "Excuse me," broke in Walter, "what did you say? Those darned bells are making such a racket, I didn't understand what you said."

Sen. John G. Townsend of Deleware, who recently announced his opposition to the Florida Cross-State Canal, is one of the big peach growers of his state.

Later note: A postcard from J. C. Chase from Syracuse on the island of Sicily, saying, among other things, "So far have not gotten my salutes mixed, and all is lovely." Showing that strict attention to business will go a long way toward keeping one out of trouble.

Whether or not we ever get to Sicily we are going to remember it as a beautiful place—from the post cards we have received from there. This one from Mr. Chase is a beauty; and a few years ago, when he was with the American Cyanamid Co., V. V. (Vic) Bowman of Gainesville, sent us a postcard from Messina picturing a view that we recall as the most beautiful ever we have seen recorded in color photography.

Letters from California indicate that citrus trees there have been making a remarkable comeback after the freeze, and that the coming season's crop is likely to be rather plentiful. Thus shattering the earlier predictions from some sources to the effect that the Pacific Slope citrus production was bound to be seriously curtailed for some time to come.

Then to find that C. N. (Pinky) Williams of Winter Park had a recent letter from Will Tillotson of Los Angeles (another ex-AFG celebrity) very much to the same effect. In fact, Will Tillotson even more optimistic concerning possible big crop figures for next season there.

The average considerably smaller size of California orange trees in part accounts for this. Planted as they generally are, 95 to the acre, they do not reach the size of average Florida trees. Thus a loss of, say, twenty percent of the wood of such trees need not mean actual loss of more bearing wood than would be involved in ten per cent of ordinary Florida orange trees.

As against these reports in some places concerning the possible plenitude of California oranges in competition next season, the actions of one of the strong factors in the Florida deal in beginning purchases of fruit for next season's requirements in May can be taken only as an indication of very considerable optimisim in that camp. Over a term of years we have known that particular factor to be wrong in its guessing only once.

While recorded contracts of these purchases do not stipulate the prices, there is a certain amount of inevitable leakage which indicates that the prices are most satisfactory from the standpoint of the growers. Certainly if the main portion of next season's crop moves out at comparable prices, there is due to be a very considerable prosperity among the producers.

Concensus of well posted opinion at this writing is that the tangerine crop is going to be light. Grapefruit too, does not seem likely to be overabundant, if the canner requirements are approximately the same as those for this past season. Early oranges do not look to be as abundant as in the past season, but mid-season fruit, with the exception of pineapple oranges, looks to be in strong volume. Indications are for a heavy Valencia crop.

A most encouraging feature is the care which groves generally are obtaining. Pest control operations look to be intelligent, and generally adequate. Fertilizer purchases, both in volume and in the high quality of the materials generally purchased, indicate that trees are being well fed. All of which should, under normal climatic conditions, argue for a good crop of fruit of excellent quality, and for the trees to go over in very good condition.

Very interesting has been the speed with which the Spring fertilizer application was applied. Once the growers made a start, action seemed almost unanimous. So rapidly were orders placed and the fertilizer distributed that some salesmen found they hardly had time to make their normal rounds.

That is the way the situation looks to this writer after returning from a fairly considerable stay at the national capital, during which we missed entirely the stir which accompanied the production of the crop of citrus legislation at Tallahassee. Which fact, we will confess, afforded only relief.

It is to be hoped that the foregoing informative matter will not bore a certain number of confirmed readers of this column. A couple of months ago the pearls we cast were to a large extent informative. We thought it was a pretty good output for us, from the standpoint of quality. Imagine our surprise when Sol Wittenstein of Orange county sought us out and kicked like a bay steer concerning it. On cross examination he admitted it was pretty good stuff, but claimed it wasn't what he and others looked for from this writer in these columns.

It rather reminded us of the occasion when our Aunt Minnie stopped in Atlanta over Sunday, and found herself in a very fashionable Episcopal church attending services. Somewhat to her surpise she heard a sermon which appealed to her strongly. So, in her simple Methodist way, she expressed her approval at intervals with a fervent "Amen!" Following about the third vocal ejaculation, one of the vestrymen pussyfooted down to her and asked her to desist. "But I am only getting religion," she protested. "Madam," whispered the vestryman in some agitation, "this is no place to get religion."

Both our wife, who is addicted to

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Lists of Florida Citrus Growers compiled from recent survey of groves, arranged by counties. Names, address, acreage and legal description.

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ORLANDO

the ups and downs of the Episcopal service, and the Right Reverend John Wing, bishop of South Florida, assure us that there is not one particle of truth in that story, but Aunt Minnie says that if we do not believe it, just to go with her some day to Atlanta and she'll show us the church. However, it serves to illustrate the point. Apparently Sol Wittenstein and other lights, such perhaps as Charlie Kime, Chum Wilder, Jimmy Baskin, George Phillips, et al and Al's brother, think that information is all right in its place, but that this writer's output is no place wherein to look for it.

Now will some of those prominents who earlier criticised so severely H. A. (Ham) Marks' federal citrus crop estimate be fair enough to step forward and apologize? The line will form on the right.

The Georgia peach crop due to be very short, so they say. Instead of from eight to nine thousand cars there is likely to be somewhere between three and four thousand cars. That should mean some real money for those growers who have the peaches; but the short crop will hardly be enough to go around among the various selling agencies that normally handle the Georgia peach deal.

Maybe some of the Florida fellows who make a habit of selling Georgia peaches after the citrus season is over will not be so long away from home this year.

A. R. Davenport of Treegold on a visit to Cincinnati and the flood area reports that the outstanding thing he noticed was the manner in which empty whisky barrels which had been in dry storage in the yards of certain distilleries had been distributed over the farming areas downstream.

Unique method of running a truck farm, that of the two Sanford men accused of lifting ten tons of fertilizer from a Waverly grove. Still they hardly could be called light-fingered.

Terry cloth or toweling is sold by the yard in a light weight and in several colors for use as bathroom curtains. It is easy to wash.

The hardest task of any doctor is trying to find a cure for spring fever.

NATURAL CHILEAN

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AGED AND MELLOWED SINCE TIME BEGAN

Scope Of Work Of The Agricultural Economics Department Of The State Experiment Station

By C. V. NOBLE
HEAD OF DEPARTMENT

The scope of research work in agricultural economics can well be summarized in six words "To help farmers make more money." The uppermost questions in all economic reserach work concerning any specific production, transportation, marketing, distribution or other activity connected with the farm business are:

1. Will it pay?
2. Will it pay better than any other competing activity employing the same land, labor, capital and management?
3. Are there constructive recommendations to make that would increase the efficiency of the best paying activities?

In attempting to answer these questions, it is not from the standpoint of a single year or season, but to endeavor to point out the farming activities that make for the greatest **continuous** profit and that would result in the operator who followed such activities being classed as a "good farmer." Dr. Liberty Hyde Bailey has stated that:

"The requirements of a good farmer are at least four:

The ability to make a full and comfortable living from the land;

To rear a family carefully and well;

To be of good service to the community;

To leave the farm more productive than it was when he took it."

This brings us to the arbitrary divisions of agricultural research. Just as agicultural economics is but an arbitrary division of all agricultural science, and as agricultural science is but an arbitrary division of general science, just so agricultural economis is arbitrarily divided into more specific fields in order that the problems to be studied may be more clearly isolated.

Farm Management is the first major division that may be mentioned. This is the science of the organization and management of a farm business for the purpose of securing the greatest **continuous** profits. It deals with the individual farm as a unit. The best tool for a farm management study is a system of well kept and detailed records of the farm business over a period of years. It is for this reason that considerable emphasis is given to record keeping and to encouraging farmers to keep the type of records best suited to their type of farming. It is impracticable to obtain the proper type of uniform farm records to serve as a basis for a farm management analysis, the next best tool is a detailed questionnaire covering all the vital information concerning a farm business and filled out by personal interviews with each farmer in the area to be studied. By the use of these tools, abiding principles of good farm management practices have been found and others will be established as research progresses.

Marketing agricultural products may comprise the second major division of agricultural economics research. The farmer's work may be only half accomplished when he has produced and harvested his commodity. His profit or loss may depend upon his efficiency in reaching the ultimate consumer with the least possible cost. This involves may difficult problems to solve. In the first place, shall he attempt to market his product independently, or shall he join with other producers in a cooperative marketing organization.

Secondly, just which essential marketing functions will it pay him to perform independently or cooperatively and which ones should he turn over to organized middlemen. Studies must be made of the comparative economic advantage of the many problems involved before an intelligent answer can be given. In the event a cooperative marketing organization seems advisable, then it is essential to study this type of organization to determine the factors that determine a strong and efficient organization. Transportation of farm products from the farm to market is one of the vital marketing functions. The comparative advantages of the many methods of transportation need careful study. Another matter that needs careful study in the performance of marketing functions is the nature of the demand for each commodity in the important consumer markets.

What are usually considered as the two major divisions of agricultural economics research have been briefly discussed. There are many other divisions, some of which are of major importance at times n the process of research work. Some of these divisions will be briefly mentioned.

1. **Buying of Agricultural Necessities.** At times the greatest leaks in the profits from a farm business may be found in the buying of such necessities as fertilizer, feed and seed. Studies of this function are essential.

2. **Historical Studies of Acreages, Yields, Prices and Other Pertinent Information.** These studies of specific commodities are frequently of great value within themselves, and are always essential as background for other types of studies.

3. **Land Economics.** This is perhaps one of the richest fields for agricultural research in our Experiment Stations, and one in which the least has been accomplished. It involves the problem of establishing the best usage that can be made of our land at a given time. In order to make such studies, full cooperation must be obtained from all agricultural subject matter fields.

4. **Farm Finance.** Studies of the different types of credit needs of farmers, and of the sources of credit that may best fill those needs are important.

5. **Land Tenure.** Studies of the "agricultural ladder" from wage to farm owner, and the economic functions of each "rung in the ladder" are very desirable.

6. **Public Problems and Policies from the Standpoint of their Economic Effect Upon Agriculture.** There are countless studies under this heading that are within the scope of agricultural economics. Rural taxation, agricultural law and the tariff on agricultural products may be mentioned as examples.

WATER HYACINTH AND ITS USE IN FERTILIZING FARM CROPS

(Continued from page 10)

analyses given are only preliminary. Further investigation may show that the chemical composition and water content of the plant varies with the seasons of the year and the conditions under which it is grown. In the use of the plant on the farm or grove the cost of taking it from the water will probably be the limiting factor. Very little data are available on this item of cost. A report comes from Louisiana that hyacinths have been removed from the water in that state by mechanical and labor methods at a cost of four-tenths cent per square yard. At that rate the cost would run about 8 cents per ton, green weight, where the growth is very heavy. If it has a value of only 50 cents a ton that would leave 42 cents for hauling and further handling. Where the material is to be hauled only a short distance it would probably be applied to the soil in the green stage. This brings up the old question of disseminating the red spider, a parasite of the plant at certain seasons. Professor Watson says no fear need be entertained in this connection, as the red spider found on the water hyacinth is a different species than the one that infests citrus trees. It has not been found infesting citrus trees, vegetable crops nor any of the field crops.

The area of water hyacinth, in the St. Johns river system alone has been estimated at 30,000 acres. Based on a few measurements, the annual yield has been estimated to run more than 100 tons per acre of green material. This would indicate a supply of about 3,000,000 tons of green material or more than 300,000 tons on an air-dry basis. It sounds like fiction when the supply of organic material from this pest in the area mentioned is assigned a value of more than $1,500,000. The figures may be far from correct, as the limited investigation as to yield and value does not afford sufficient data to establish a reliable basis for estimates. At any rate the material is here in great abundance and the supply is rapidly increasing. It has value as a manure in crop production on practically all of our soils. It only remains to find a more practicable ways and means of handling the material so as to make its use more economical and consequently more general.

ORLANDO CITRUS PRODUCTION CREDIT ASSOCIATION TO HOLD ANNUAL STOCKHOLDERS MEETING JUL. 18

An invitation is extended to all citrus growers of Florida to attend the Annual Meeting of the Orlando Citrus Production Credit Association at Orlando, on Tuesday, July 13, 1937, at 10:30 A. M., at San Juan Hotel, it is announced by Philip Marz, Jr., Secretary of the Association. After the meeting, all those present will be served a luncheon in the dining room of the Greater Orlando Chamber of Commerce building.

The Orlando association was organized under the Farm Credit Act of 1933 and set up for the exclusive use of the citrus growers and makes loans in all citrus producing counties of the state. Every grower who borrowed production money from the Association is a stockholder and is expected to attend this Annual Meeting which is held for the purpose of hearing complete reports of the activities of the Association, the election of officers and the transaction of such other business as may come before the body.

(Continued on page 22)

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Joe Lyons --

An Appreciation
By Frank Kay Anderson

Maybe it was fifteen years ago.

We were driving from Tampa up to Gainesville to attend a citrus seminar. It was raining all the way. Travel over the then clay roads of Lake County was precarious. We jogged along at not to exceed eighteen miles an hour, and, even so, now and then skidded alarmingly. The writer sat at the wheel, while Joe Lyons and S. L. Frisbie dwelt in the gloomy interior of the curtained car, now and then providing conversational entertainment. S u d d e n l y, while we were traversing the greasy slope of a high fill, the car went into the worst skid of all. The wheel whirled uselessly, and the car started to slide sideways down a fifteen foot embankment. Too busy to have time to be frightened, we tugged and twisted at the wheel, and through some sudden vagary, the car responded and we came out of the skid to slide slowly, front-end foremost, safely to the bottom of the embankment. For half a moment there was dead silence. Then Joe Lyons spoke. "Thank God for that," he said, "but do you know I was just thinking how glad I was I had written a letter to Mother this morning, and mailed it before we left."

That was typical of Joe. Even in periods of great stress his first thought was for others. That is why Joe Lyons is going to be so dreadfully missed.

A large portion of the citrus belt was very nearly depopulated through the attendance of so many upon his funeral. It was love, rather than the normal obeisance to one in a high place, which prompted so very many to wish to be present at the last rites for Joe Lyons.

He was a many-sided man. In his early days he obtained quite a success in vaudeville. Then, he was an artist. And he was a good one. It may interest many of the friends of his later years to learn that Joe for a period of years was one of the very successful women's fashion artists of the country, at that time in the employ of The Ladies Home Journal.

Coming to Florida, he dug his original Citrus Park grove out of the woods with his own hands, working right along with his gang, with saw, axe and grubbing-hoe. It was while this young grove was developing to bearing age that he found time on his hands, and took up the business of selling fertilizers. He persuaded Lem Woods that if he thought enough of Lem's products to buy them, he could do a pretty good job of selling Gulf fertilizer to other growers. He did such an astonishingly good job of selling that it was not very long before he was salesmanager for the Gulf company.

In that capacity, he was very happy, and a wizard for effectiveness. We believe that connection would have endured to the time of his death if Mr. Woods had been willing to sell him a substantial interest in the business. Lem Woods, too, loved Joe Lyons. He was willing to do almost anything for him; but he did not want to part with his ownership of the company he had built up so successfully. Gulf was Lem Woods' baby. He had raised it to a most satisfactory maturity. He wanted to retain the right to do with it wholly as he pleased, with no necessity for consulting with anyone. Regardless of whom that anyone might be. For months Lem Woods and Joe Lyons wrestled over the subject. Then regretfully Joe Lyons withdrew; and regretfully Lem Woods witnessed his withdrawal.

The Lyons Fertilizer Co. was born; and Joe Lyons with Bill Waring, began a spectacular bid for business which shortly set a record in establishing the new business in the front ranks among the larger industries of Florida. It saw quick periods of large success, and encountered much hard going during the depression, to emerge upon a firm foundation in the front ranks of concerns of its character.

Living in Tampa during the time that Joe Lyons was at the peak of his success as salesmanager for the Gulf company, we had the good fortune to live as close neighbors to Joe Lyons and his family. Thus we came to know the finest side of him, Joe Lyons as a family man. In that respect he was truly wonderful. At our house, if we checked up short at mealtime, it meant that the kids were over with the Lyons. If we were over, it was one or the other of the Lyons' youngsters likely at the table. On that basis one gets to know a lot about a fellow, and the more we learned concerning Joe Lyons, the more highly we thought of him.

He was a working fool; but no matter how hard he drove himself, he managed to preserve a poise and calm friendliness for his family that was wonderful to behold. He paid close attention to business and was willing to work without stint; but his first time and attention was for his family.

In addition to remarkable personality, Joe possessed a sort of inner regard for his fellow men which served to tie fast to him a vast num-

C. W. (JOE) LYONS

Beloved citizen of Florida, whose recent death comes as a shock not only to his intimate associates but to the entire citrus industry which he loved so well and in which he was so important a factor.

ber of those with whom his contacts in the beginning were only casual.

In citrus circles, he was a harmonizer. In the face of his eternal goodwill toward his fellows, petty differences originating in business jealousies had a tendency to drift into the background and disappear. He was always sincerely devoting himself to whatever at the time looked toward the general good of the industry, and in that endeavor found it possible to work in harmony with whoever else at the time was similarly minded.

His recent elevation to the presidency of the Florida State Horticultural Society was fitting recognition for his long term of service to the industry. His sudden passing will be a blow to that long established and enduring body. He would have worked no harder, however, because of a bestowal upon him of the highest office within the gift of the Society. He did not care for titles. He was willing to give his best efforts to any cause he espoused in capacity of a simple member.

That Charles W. Lyons should have been known to many thousands as "Joe" in itself is indicative of an unusual personality. So widely was he known thus that in the telephone book and city directory, he had himself listed as "C. W. (Joe) Lyons." In fact, to almost all save his wife and mother, he was plain "Joe," and his proper name or initials largely were forgotten. The real origin of this nickname is somewhat obscure. We are not certain, but there is inclination to believe it was due to certain inimitable stories which he told with great effectiveness in broken English concerning an Italian character named Joe. This probably fixed the nickname upon him; and finally he became so accustomed to it that had anyone other than his wife or mother addressed him as "Charles," he might not have known just who was being spoken to.

In writing like this of Joe Lyons, it is queer the things which come to mind that serve to illustrate his adaptability and his remarkable willingness to serve. Numerous incidents could be cited. One stands silhouted in memory. It was in 1923. This writer was serving as president of the press association. Governor Cary Hardee was a distinguished guest at an association gathering in Lakeland. It devolved upon us to play host. It had been understood that the Governor was to depart in mid-afternoon, upon adjournment of the gathering. Suddenly it was learned that the Governor would not depart until late at night by train. Something had to be done about it to avoid a bust, in the social sense. Hastily we gathered together a few choice spirits, and with equal haste arranged for a steak dinner at the Elks Club. In a pinch one thinks fast, and turns for aid where sympathy and previous performance promises aid will be forthcoming. We telephoned to Joe Lyons in Tampa. He drove to Lakeland without hesitating or quibbling, and arrived in time to give valued reinforcement. Not only did he come prepared to do whatever he might, but on the way he picked up M. H. (Mike) Dorsett, now freight traffic manager of the Atlantic Coast Line R. R., and brought him along as an added attraction.

The dinner was a big success. Joe Lyons clowned, and sang, and danced with all the verve and talent which had made him earlier a first class vaudeville attraction; and he played while Mike Dorsett, who, by the way, is a reformed choir-singer, sang. Every one enjoyed himself and herself to the limit. Governor Hardee relaxed to an extent we never saw him do before or since. He had the time of his life. The occasion was more than saved. It was made a memorable success. All because Joe Lyons was willing to go the limit to help out a friend, with no possible reward in sight.

A byplay of the dinner was the sudden agitation of our wife during the meal. Without attracting the attention of the Governor or other guests, she managed, by the sort of thought transference by which wives sometimes communicate with husbands, to convey to us at the other end of the table, the fact that we had done, and were doing, something awful. For the moment we looked about in panic without discovering the cause of her agitation. Then we saw we had put our well-known foot in it, by having had beautiful steaks served to Joe and Mike; and it was a Friday night. Those two good Catholic churchmen were tremendously embarrassed, but characteristically were trying to cover it up by toying with their food under cover of much conversation. The lady was in time, and we managed to have the steward quickly substitute fish for the two, and emerged without dishonor even if with little credit.

Like everything else which he took seriously, Joe Lyons thought a lot of his religion. He tried sincerely to make a good job of it. It was not irksome to him, it was a privilege.

In Tampa, Joe Lyons came to occupy a civic niche as unique as it was highly placed. He was easily Tampa's outstanding citizen, even if in point of wealth or time of residence he did not began to approach some of his fellow leaders. Ed Lambright's obituary editorial in the Tampa Tribune, entitled "Good Bye, Joe" was more than a beautiful bit of writing. It was perhaps the most sincere and feeling tribute to the passing of a citizen ever we have seen in decades of editorial reading. Only a truly remarkable man with a heart as big as the proverbial piano could have served as inspiration for such a bit of writing.

Joe Lyons is gone. How we are going to miss him! We shall not try to say it, for Ed Lambright has put it into words so beautiful and sincere that they should not be parodied. The salutation of his editorial shall serve for this writer, as for thousands of others of Joe Lyons' friends upon the peninsula:

"Good Bye, Joe."

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CURRENT WORK OF THE ENTOMOLOGY DEPARTMENT STATE EXPERIMENT STA.

(Continued from page 3)

watermelon fields has been under investigation by Mr. Goff of the Leesburg Station. The soil in many watermelon fields is too light for the best growth of **Crotalaria spectabilis.** It would seem that **Crotalaria striata** works better on these soils of poor moisture holding capacity. It seems entirely practicable by this means to establish a two-year rotation crop for watermelon as far as root-knot is concerned.

Another phase of the root-knot problem is the attempt to develop resistant varieties of truck crops. This work for the present is being concentrated largely on lettuce, beans, peppers, tomatoes and cowpeas. We seem to be making some progress toward developing resistant strains, particularly of lettuce, beans and cowpeas.

A new bulletin on the subject of root-knot is being prepared. One has recently been published on the effect of root-knot on annual ornamentals, such as are commonly raised in flower gardens of Florida.

The work on pecans has again been taken up by the appointment of Mr. S. O. Hill to our Field Laboratory at Monticello. Mr. Hill is being employed jointly by the Experiment Station and the Bureau of Entomology of the U. S. Department of Agriculture. He will work particularly on the control of the nut case-bearer but will not neglect other insects of pecans.

Considerable attention has been paid to thrips especially the onion thrips, the gladiolus thrips, and the Florida flower thrips. The important thing in control of the gladiolus thrips is to prevent its importation into fields where it does not exist. For this purpose all bulbs, particularly those which are purchased from the more northern states, should be treated with mercuric chloride, one part of corrosive sublimate to 1,000 parts of water. This thrip can be controlled by dusting or spraying or by poisoned baits. It is important to not allow a heavy infestation to build up before control measures are started.

Flowers on which the flower thrips are particularly difficult to control are chrysanthemums and roses. A poison bait gives promise of being useful against these pests. Other species of thrips are pests of avocadoes, mangoes, ficus, strawberries, lilies and many other plants. On the other hand some are beneficial predators. A study is being made of all the thrips of Florida and their habits.

The discovery a couple of years ago of the pepper weevil in one of the counties of Florida has necessitated a study of this insect under Florida conditions. It has been found that complete destruction of peppers at the end of the shipping season in June or July gives a very thorough control of the weevil, but must be done on a community basis. All growers must cooperate to make the control thorough.

Dr. Wilson of our laboratory at Leesburg has given special attention to the insects which attack commercial ornamentals, such as **Asparagus plumosus** and bulbs, including gladiolus, narcissus, etc. Efficient means of controlling the pests of these plants have been developed.

Mr. Goff, of the same laboratory, has for one of his projects that of destructive rodents, including mice, which are particularly destructive in watermelon fields, although they do a great deal of damage to corn as well; moles, which are especially injurious to lawns and gardens; gophers which are often a great annoyance in citrus groves; and salamanders, which are not only injurious in citrus groves and gardens but are especially injurious in pecan orchards and peanut fields. A bait poisoned with alkaloid strychnine has been found best for mice; gophers were found to be best controlled by soaking pieces of corn cob in carbon bisulphide and throwing them down their holes, which should be at once stopped up; salamanders by trapping.

Dr. Tissot of the department is a specialist on aphids. Work with Florida aphids includes studies on the aphid fauna of the State and experiments with some of the newer contact insecticides in an attempt to find better and more efficient means of control. Though only about a dozen species of aphids are now of economic importance in Florida a great many more are potentially important and may become pests under certain conditions of crops and climate. Aphids on different crops sometimes require slightly different methods of control and attempts are made to learn which method is best adapted to the various truck and fruit crops grown here.

Control experiments conducted against the bean jassid have resulted in the development of a method of control that has proven very effective. This consists of dusting the plants with a mixture of pyrethrum and sulfur or a similar mixture in which derris or cube is substituted for the pyrethrum. These mixtures quickly reduce the jassid population and the sulfur tends to prevent reinfestation from the surrounding areas.

Another of our projects is the larger plant bugs, which are often very destructive not only to truck crops but particularly to citrus. The control in citrus groves centers largely around the proper management of the cover crops. Their parasites have been closely studied. One known as the feather-legged fly is particularly important. The Experiment Station has in the last two years cooperated with the Department of Agriculture of Australia in an effort to import this fly into that region. Heretofore we have not had a spray safe to use on foilage which would kill the southern green stink bug, often called pumpkin bug. Some of the newer insecticides seem to give promise and

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are being investigated.

At the Everglades Experiment Station we have an eitomologist, Mr. Lobdell, who gives attention particularly to the insect pests of that region. One of his main projects is an attempt to colonize and spread parasites of the cane borers.

In addition to these projects the department is called upon every year to answer thousands of calls and letters on other insects. It is our aim to be in a position to give advice on the control of any destructive insect in Florida and as far as possible to be able to identify any insect which may be sent in. Growers troubled by any particular insect, or even curious to know the name of any interesting insect are encouraged to send specimens to Gainesville for identification and advice as to control, if injurious.

Among the insect concerning which we answer numerous inquiries are those in houses and buildings in general, including termites, powdery post beetles, plaster bagworms, ants, cockroaches and clothes moths. On peaches, the plum curculio, borers and San Jose scale are the chief pests, for all of which we have satisfactory means of control. On shade trees borers are the cause of most inquiries, though many, including the Australian pines, are severely attacked by the twig girdlers. Among the chief insects concerning which truckers ask for advice are mole crickets, grasshoppers and cutworms. Many inquiries are answered concerning insects troubling ornamentals, of which chinch bugs on St. Augustine grass lawns form a large proportion, though many letters are received concerning the oleander caterpillar and various scale insects on ornamentals.

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National-Riverside Co.
Covina, California

A RESUME OF THE WORK OF THE HORTICULTURAL DEPARTMENT

(Continued from page 7)

in experiments with green manure crops of legumes. From this work, an economical cover crop and fertilizing program, which will maintain nut production under Florida conditions, has been developed.

All along in the pecan experimental field, varieties have been tested by this department. Now definite data are available regarding the characteristics and behavior of many different types.

The Department is constantly looking for new products and new uses for old products, or different methods of preparation that will give fruits, vegetables or nuts wider distribution and greater consumption, and thus more extensive markets. Work with frozen fruits and juices has already been referred to.

Pecan oil is one of such products prepared in the laboratories of the department and a considerable quantity has been expressed from the kernels of several varieties. By subjecting the kernels (cold and unground) to 12 tons pressure the oil expressed ranged from 25 to 36 per cent of the kernel weight, except one variety, which yielded only 13 per cent. The oil is a clear, golden liquid and offers great possibilties as a cooking and salad oil and for other uses. It makes a mayonnaise dressing of excellent qualities with the recipe most generaly used.

In further work along this line, a delicious butter was made from the pomace left after the oil had been pressed from the kernels. This material seems to be an excellent food product and doubtless can be used in many ways in the home, and commercially by the confection, baking, and ice cream industries.

Experimental work with various other crops is being continously conducted. Some of these include blackberries, dewberries, blueberries, avocados, grapes, bulbs and many others.

Fumigation research is in the charge of R. J. Wilmot. This deals with investigations into the uses of hydrocyanic acid and other gases as fumigants for vegetables, fruit, plants and nursery stock. A portable gas analysis instrument has been developed and constructed which will prove of great value in connection with practical fumigation work.

This department is a clearing house, so to speak, for testing various horticultural plants introduced and distributed by the United States Department of Agriculture. Through this channel several crops, of which the tung-oil tree is a notable example, have found their way into commercial production.

Horticultural investigations are of such a nature that it takes considerable time — many years in some instances — to complete a certain line of work. Nevertheless, as time goes on, progress is made and new developments take place and data can be published on that part which is conclusive. Consequently, numerous publications, which can be had for the asking, are available on many subjects, including cold storage of citrus fruits, various trees for ornamental uses, pecans, tung-oil, vegetables, tropical and sub-tropical fruits, citrus propagation, avocados, fertilizers, cover crops and many others.

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RUST MITES

(Continued from page 9)

In comparing early rust mite and melanose injuries, a distinct difference is apparent. The corked melanose lesions are more raised, much wider, and a darker color than the lesions caused by rust mites. On fruit where the dark corky material caused by melanose has sluffed off, the rind has a somewhat scaly appearance which is not typical of rust mite injury.

Suggestions for Preventing Rust Mite Injury

The speckled, or early, rust mite injury has been observed more on early and mid-season fruit than on the late varieties. The probable reason for this is that the early and mid-season varieties receive no sulfur spray or dust for rust mite control after September or October. Between the fall and spring application, which is usually in April or early May, the mites have had six to eight months to build up a very heavy infestation on the leaves. When the oranges reach the size, or age, that mites feed on them, the mites may migrate to the fruit in a very short time and mark them before control measures can be taken. The bloom is often irregular, as is the case this year, and naturally there will be considerable difference in size of fruit. Consequently, the larger fruit will very likely be injured by mites if spraying is delayed until the full crop is set. In some years the bloom appears to come out rather evenly but there is a marked difference in the size of the fruit early in the spring and, as a result, if mites are present they will infest the larger fruit before a general infestation is apparent. Should rust mite control on oranges be delayed from the middle of April to the middle of May, it may be necessary to either neglect rust mite control or the melanose sprays which are usually applied at that time of the year. This is especially true if the grower, or caretaker, has a large acreage to cover. If the oranges are to receive a copper spray for the melanose control, then wettable sulfur can be added to the spray. When large areas are to be cared for with a limited number of spray machines and when melanose sprays are not necessary, the sulfur sprays could be applied sometime before the fruit has set.

The advisability of early spraying can be determined by the degree of rust mite infestation on the leaves. Both the underside and upperside of the leaves should be examined. Another point in favor of early spraying is that a more satisfactory control of mites can be obtained when there is no fruit on the trees because a more thorough coverage can be obtained.

The general recommendation, or practice, has been to control rust mites when about 30 to 35 per cent of the lens fields were infested. It might be well to start spraying before the mites have increased to that extent. The length of time that is necessary for any certain number of mites to mark a young fruit has not been determined, but until that information is obtained it would be well to control the mites soon after they make their appearance in the grove, if a high percentage of bright fruit is to be produced.

The smooth, solid type of russeting is quite common on Valencias and from observations made during the past year the speckled type was not so common on that variety as on the early and mid-season varieties. The reason for that difference may be that since the Valencias are a late variety and are not usually picked until after March, the mites have been controlled during the winter months and are not present in sufficient numbers to mark the young fruit early in the season.

It has been stated in citrus meetings that there is a higher percentage of Valencia russets than of the earlier varieties. Rust mites are very hard to see on fruit after it has colored, and growers are sometimes unaware that there is a heavy infestation of mites until after the fruit is marked. Mites can be readily detected on leaves, and when the fruit has colored, the leaves, especially under sides, should be examined. W. W. Yothers and Arthur C. Mason* show that a much higher percentage of

(Continued on page 21)

THE SWIFT PLAN for CONTROLLED Tree Feeding

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New Juice Extractor Attracts Attention

A blazing Florida sun beat down from a cloudless sky, on a hot but otherwise perfect day some six years ago as a serious faced youngster of nineteen perched on the stool of a refreshment stand near Lakeland, Florida.

His need for refreshment was imperative and his curt "Orange Juice" brought an immediate glass of the sparkling fluid from a dispenser near at hand. The boy sipped his drink in silence then turned to the clerk behind the counter: "Is this juice canned or fresh?" he inquired. Upon being informed that fresh juice was out of the question at that time of the year he lapsed again into silence. Without further ado he left the stand but the memory of that drink remained with him for hours afterwards as he vainly attempted to erase from his lips and tongue the burn of the pungent oil accumulated in the juice which he had tasted earlier in the day.

It was an unpleasant experience for young E. E. Edenfield — it put him to thinking, and the train of thought induced by a pair of burned lips crystalized into a commercial juice extractor which under the hardest kind of practical test has proven that citrus juice can be extracted mechanically, easily, economically and above all, palatably.

Young Edenfield spent hours of patient and laborious work in his little home work shop, but the result was a clumsy, tho albeit, workable model which convinced the youngster that he was on the right track.

Finally convinced by his own efforts that he had the makings of a commercially valuable machine, but lacking the necessary finances to further pursue his experiments, he carried his problem to W. A. Spivey, Lakeland business man who was quick to recognize the potential value of the machine. With Spivey's backing he carried his homemade models to a machine shop whose name had for years been a by-word among growers and plant operators througnout Florida. Robert Peacock of the firm of Peacock Brothers, builders of irrigation valves and cover crop cutters, was equally quick to see the advantages of the machine and so under young Edenfield's supervision, with the latest type of machinery at hand their commercial extractor was built.

Leading canners throughout the state were enthusiastic from the outset and although many improvements yet remained to be made in the original machine, experiment and adjustment finally produced an extractor which met with full approval.

And so it came to pass, as the culmination of six years of painstaking effort, that the Juice Extracting Machinery Corporation, of Lakeland, Florida, came into being.

The machine itself is a relatively simple apparatus, although it solves a problem which has baffled designers ever since the feasibility of canning citrus juice was first demonstrated.

The fruit which has been sized before it is introduced into the extractor is fed into studded cups, capable of holding a half fruit. Constant tension applied to both sides of the holder by means of springs precludes the possibility of dropping. These cups are carried through the cycle of extraction on an endless chain which is timed by means of cams to coincide with similar cups which grip the exposed half of the fruit just before it is introduced to the cutting blade. With almost lightening like rapidity the fruit is severed and the two halves go in opposite directions.

It is at this point in the operation that probably the chief purpose of the machine is achieved. The half fruit is pressed gently against a stainless steel table in which are located holes of studied diameter, and which are bordered by raised rims which engage the fruit just inside the peel. Through these holes come plungers superimposed with stainless reamers the blades of which are gently rounded rather than sharp edged. Fourteen revolutions of this reamer extracts the juice from the fruit without disengaging the rag or pulp. Stainless steel pipes convey the juice to the strainers while the hulls by means of an endless belt are headed for the dump pile. And there you have it — citrus juice, which, from the fruit wherein it was sealed by nature, to the container, has been untouched by human hands. Pure, oiless and completely sanitary.

Every part of the machine which comes in contact with the juice is constructed of stainless, acid-resisting steel and may be hosed down and sterilized whenever necessary with only a moment's interruption in the operating schedule.

Each unit has an approximate capacity of one and one-half boxes of fruit per minute. Various sized cups and reamers are available to accomodate any size fruit and the yield in price of course depends upon both quality and size.

So easy to manipulate is the machine that two streams of similar sized fruit may be introduced, or single lines of different sizes may be extracted simultaneously.

Put to a practical test throughout the past canning season the new extractor was found to satisfy a want which has long been felt in the canning industry. It proved economical to operate and averaged a 10 per cent greater yield in juice than customary.

One has only to sample the juice extracted by Edenfield's machine, a most palatable drink entirely free from all objectionable features, to become a convert to his process.

C. B. S.—

RUST MITES

(Continued from page 20)

mites are found on the under surface of the leaves than on the upper surface, and the writer has also found that to be invariably true.

This paper has been given as a progress report and with the hope that more information on the subject of early rust mite injury and control can be obtained during the next few years.

*The Citrus Rust Mite and Its Control, Tech. Bul. No. 176, U. S. Dept. of Agr.

WHY SPEND MORE?

Citrus growers who have cooperated with us for from 3 to 6 years spend an average of from $30 to $45 per acre for fertilizing, spraying, pruning, irrigation, cultivating, and other items that would be included in direct costs. This is about $30 under the average for the state as a whole on comparable groves.

The trees in our groves are in better condition than they were when we took them over. The production of fruit has been maintained or increased (average production from 300 to 500 boxes mixed fruit per acre on 15 to 20 year old trees). The quality of the fruit is improved along with the increased quantity.

The cost of fruit from 15 to 20 year old trees in groves under our advice runs 15c and less for grapefruit and 35c and less for oranges per box.

So—it all simmers down to
WHY SPEND MORE?

Keenan Soil Laboratory
Frostproof, Florida

ORLANDO CITRUS PRODUCTION CREDIT ASSOCIATION TO HOLD ANNUAL STOCKHOLDERS MEETING JUL. 18

(Continued from page 15)

"We shall be very pleased to have all citrus growers who are not stockholders also attend the meeting," Mr. Marz said, "in order that they might learn of the credit service which is offered to the citrus growers of this State by the Association. The Orlando Association loans citrus growers money for the purchase of fertilizer, insecticides, grove labor, taxes and interest on Federal Land Bank mortgages, etc., at the low rate of 5 per cent per annum. Borrowers are permitted to budget their loans, getting the funds as needed during the season and repaying the loan as the crop is harvested, thus paying interest only for the time the money is actually in use in the production of the crop.

Thousands of growers and farmers over the country are now stockholders in production credit associations and are thoroughly sold on the idea of cooperative credit. "We are anxious that every citrus grower in Florida shall at least have the opportunity of knowing of the credit service that we have to offer and we cordially invite all to our Annual Meeting, said Mr. Marz.

The officers of the Association are, A. E. Pickard, President, Orlando; C. H. Walker, Vice President, Avon Park; Philip Marz, Jr., Secretary-Treasurer, Orlando. The Board of Directors are as follows: A. E. Pickard, Orlando; C. H. Walker, Avon Park; John D. Clark, Waverly; F. G. Moorehead, Deland; Leo H. Wilson, Bradenton; V. L. Bullis, Orlando and J. J. Parrish, Titusville.

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CROTALARIA—New crop, high quality, double cleaned, scarified Crotalaria Striata seed for sale. Attractive prices. Carolinas' Crotalaria Co., Camden, S. C.

FOR SALE—80 acres good citrus land, two miles northwest of Cocoa, Brevard County, Florida. Price $1600.00 cash. S. Hendry, City Point, Florida.

Our supply of Hamlins on Cleopatra root is running low. Advise orderding early. Zellwood Nurseries, Zellwood, Florida.

FILMS DEVELOPED 2 prints of each 25c; 20 reprints 25c. Pine Photo, Y-5134 Nevada, Chicago.

THRIFTY TREES and budwood from record performance Perrine Lemon parents. Persian Lime and other citrus varieties. DeSoto Nurseries, DeSoto City, Fla.

WANTED—To hear from owner of land for sale. O. Hawley, Baldwin, Wis.

QUIT TOBACCO easily, inexpensively, without drugs. Send address. Ezra Stokes, Mohawk, Florida.

ALYCE CLOVER, the best legume for hay or covercrop. Write for information. Hardin Groves, Box 63, Lakeland, Fla.

CAUSERIENCE LEPIDOFLOIA—(So-called Brazilian oak), resembles Australian pine. Grand for wind-breaks. Cold resistant. Beautiful. Send for sample of foliage. $6.00 per 100. S. S. Matthews, Homestead, Fla.

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FOR SALE—Small packing house machinery and equipment complete. Apply Hector Supply Company, Miami.

MEN WANTED—Sell shirts. No experience necessary. Free samples. Commission in advance. Free ties with shirts. Carroll Mills, 875A Flatbush Av., Brooklyn, N. Y.

LARGE Valencia, Hamlin, Perrine Lemon and grapefruit trees. Other varieties medium sized trees. Order now. Ward's Nursery, Avon Park, Fla.

FOR SALE: Several desirable bearing grapefruit and orange groves, in good condition, at extremely low prices. For information write H. C. Case, Box 87, Fort Myers, Fla.

"EVERY TRACTOR OWNER NEEDS IRVING'S 60 page 1937 tractor replacement parts catalog. Absolutely free. Thousands parts, all makes, tremendous price savings. Irving's Tractor Lug Co., 109 Knoxville Road, Galesburg, Illinois.

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WANTED—To hear from owner having good farm for sale. Cash price, particulars. John Black, Chippewa Falls, Wisconsin.

PUREBRED PULLETS FOR SALE—White Leghorns and Anconas ready to ship. Barred Rocks and R. I. Reds shortly. Several hundred yearling White Leghorn hens now laying 70%. Write or wire for prices. C. A. Norman, Dr. 1440, Knoxville, Tenn.

LAREDO SOY BEANS, considered free from nematode, excellent for hay and soil improvement. Write the Baldwin County Seed Growers Association, Loxley, Alabama, for prices.

SCENIC HIGHWAY NURSERIES has a large stock of early and late grapefruit and oranges. One, two and three year buds. This nursery has been operated since 1883 by G. H. Gibbons, Waverly, Fla.

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CITRUS SEEDLINGS, all root stock varieties. $10.00 per 1000 up. Grand Island Nurseries, Eustis, Fla.

BUDDED trees new Florida commercial lemon, proven, thin skinned, juicy, scab immune. Also rough lemon, sour orange and Cleopatra seed and liningout seedlings. DeSoto Nurseries, DeSoto City, Fla.

SEEDS—ROUGH LEMON, SOUR ORANGE, CLEOPATRA. Pure, fresh, good germination. Also seedlings lineout size. De Soto Nurseries, DeSoto City, Fla.

CROTALARIA SPECTABILIS—Seed for sale. New crop, well cured, bright and clean. Price 25c per pound in 100 pound lots and over, 30c per pound in less quantities, f.o.b. Hastings, Bunnell, Lowell and San Antonio, Florida. F. M. LEONARD & COMPANY, Hastings, Florida.

WANTED—Position as packing house foreman; in citrus business twenty-five years; ten years' experience as foreman; married man. J. R. Henry, Okahumpka, Florida.

2 YEAR FIELD GROWN ROSES: Red, Pink, Shell, Salmon, White Radiance, Hollande, Columbia, Milady, Luxemburg, Edel, Padre, Victoria Talisman, Persian. All 19c each, postpaid, ship COD. Catalog free. NAUGHTON FARMS, Waxahachie, Texas.

CROTALARIA SPECTABILIS, fresh crop, scarified, $15.00 per 100 lbs. F. O. B. Eustis. GRAND ISLAND NURSERIES, EUSTIS, FLA.

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